

## **Findings of Investigation**

### **7. Conclusions and Recommendations**

#### **Conclusions**

- 7.1 The Task Force had conducted a scientific and comprehensive inquiry into the incident in an impartial, objective and fair manner with a view to identifying the relevant facts and analysing the causes of the LPG vehicle engine stalling incident (the incident).
- 7.2 While it was not possible for the Task Force to ascertain the exact number of LPG vehicles which experienced engine stalling problems between 31 December 2009 and 3 January 2010 (the period of the incident), after meeting relevant trades and gaining an in-depth understanding of the incident, the Task Force believed that quite a number of LPG vehicles had engine stalling problems during those days.
- 7.3 The Task Force and the sub-groups had conducted an in-depth investigation into the factors which might have caused the incident, including-
  - (i) whether the quality of LPG complied with the specification;
  - (ii) whether the LPG was contaminated;
  - (iii) whether the LPG supply facilities were properly operated and maintained; and
  - (iv) whether the LPG vehicles were properly operated and maintained.
- 7.4 Since Sinopec could not provide reasonable explanations, the Task Force had reasonable doubts that during the key investigation period, Sinopec had not followed its terminal operational procedures on 8 occasions when conducting water draining operations.

- 7.5 The Task Force did not have any evidence to ascertain that those 8 water draining operations, in which Sinopec was suspected not to have complied with its terminal operation procedures, were the direct cause of the incident. However, the Task Force considered that those water draining operations, which were suspected not to have complied with procedures, might affect LPG quality.
- 7.6 Having carried out a site inspection on the operation of Sinopec's LPG terminal facilities and checked the relevant records, the Task Force did not identify any other irregularity in the operation and maintenance of Sinopec's LPG terminal and LPG road tankers during the key investigation period, apart from the water draining operations.
- 7.7 Having carried out site inspections on the operation of the facilities at Sinopec's filling stations and checked the relevant records, the Task Force did not identify any irregularity in the operation and maintenance of Sinopec's filling stations during the key investigation period.
- 7.8 The Task Force believed that in case there were deposits in the underground LPG tanks, as long as the various filtration facilities of different porosity in the filling stations were functioning normally, the deposits should have been screened and would not be delivered to the fuel tanks of LPG vehicles.
- 7.9 As the 14 LPG samples mentioned in paragraph 5.10 were taken on or after 7 January 2010, the laboratory test results of these samples could not help determine whether there were problems with the quality of LPG between 31 December 2009 and 3 January 2010, since the properties of the LPG samples would have been diluted by the refills after 3 January 2010.
- 7.10 Since 7 January 2010, the EMSD had taken a total of 14 LPG samples from different LPG terminals and filling stations, and a fuel tank from an LPG vehicle which was claimed to have experienced severe engine stalling problems. The laboratory test results showed that the quality of LPG would not affect the performance of the vehicles.

- 7.11 It is a normal to find residues in the fuel systems of LPG vehicles, including the vaporisers. The issue is whether the quantity of the residues would affect the normal operation of the vehicles. The Task Force considered that if the quality of the LPG complies with the local auto-LPG specifications, the amount of residues can be reduced through regular maintenance so that the normal operation of the LPG vehicles would not be affected.
- 7.12 LPG vehicles were introduced to Hong Kong some 10 years ago. Taking into account the mileage and age of the LPG vehicles, the Task Force considered that failure related to mechanical parts or the fuel system was expectable.
- 7.13 The Task Force considered that the engine of LPG vehicles would stall frequently if the idling speed is too low. It can be triggered by -
- (i) factors related to the LPG fuel system, e.g. a leak in the vaporiser or a blockage of the vapour fuel path;
  - (ii) factors not related to the LPG fuel system, e.g. the malfunctioning of the idle-up device or the thermostat of the cooling system; and
  - (iii) improper tuning of the LPG fuel system.
- 7.14 The Task Force did not have any evidence to ascertain that the maintenance of LPG vehicles was a direct cause of the incident. However, the Task Force considered that the maintenance and the proper functioning of LPG vehicles were interrelated to a certain extent.
- 7.15 On the basis of the above findings, in particular the observations in paragraphs 7.4 to 7.5 and 7.13 to 7.14, the Task Force could not rule out the possibilities that the incident was caused by more than one factor.

7.16 In the light of the investigation findings, the Task Force made recommendations on a number of improvement measures to EMSD with a view to enhancing the monitoring of LPG quality, improving the operation of LPG facilities as well as the repair and maintenance of LPG vehicles, so as to prevent the recurrence of similar incidents.

### Recommendations

7.17 The EMSD accepted the recommendations made by the Task Force on improving the safe operation of LPG vehicles, which include -

- (i) strengthening the monitoring on Sinopec and other LPG supply companies, in respect of the water draining operations of LPG terminals;
- (ii) strengthening the monitoring of Sinopec and other LPG supply companies in respect of the regular removal of deposits in LPG tanks;
- (iii) continuing to conduct random LPG sample tests to ensure that the LPG quality complies with the requirements and publishing the detailed test results online for public reference;
- (iv) expediting the drafting of a code of practice on the repair and maintenance of LPG vehicle fuel system, to enhance the trade's awareness of the importance of maintenance and repair;
- (v) maintaining the hotline for continuous monitoring of the operation of LPG vehicles and follow-up action;
- (vi) stepping up publicity for the trade (including vehicle owners and drivers) to enhance the repair and maintenance of LPG vehicles and ensure road safety; and
- (vii) formulating further improvement measures with reference to the results of the LPG Vehicle Testing Scheme.